CHAPTER 2
Demand Estimates and Projections

Demand estimates for 2000 and projections for 2025 were made for six categories of water use. The category of *Public Water Supply* refers to all potable water supplied by water treatment facilities reporting average pumpages greater than 100,000 gallons per day (GPD) to all types of customers, not just residential. The other five categories of water use are self-supplied. *Commercial and Industrial* refers to self-supplied business operations using 100,000 GPD (0.1 MGD) or more. *Recreational Self-Supply* includes landscape and golf course irrigation demand. The landscape subcategory includes water used for parks, cemeteries and other self-supplied irrigation applications with demands greater than 100,000 GPD. The golf course subcategory includes those operations using groundwater or surface water, but not those using reclaimed water. The *Domestic Self-Supply* category includes only those households whose primary sources of water are private wells. *Thermoelectric Power Generation Self-Supply* water refers to replacement water for losses from cooling water at electrical plants; this does not include facilities using ocean water for cooling. *Agriculture* includes water used to irrigate all crops, and for cattle watering. The water needs of the environment are also explained in this chapter.

For 2000, the total assessed water demand for the Upper East Coast (UEC) Planning Area was approximately 292 million gallons per day (MGD), and this is projected to grow to 337 MGD by 2025 (**Figure 4**).

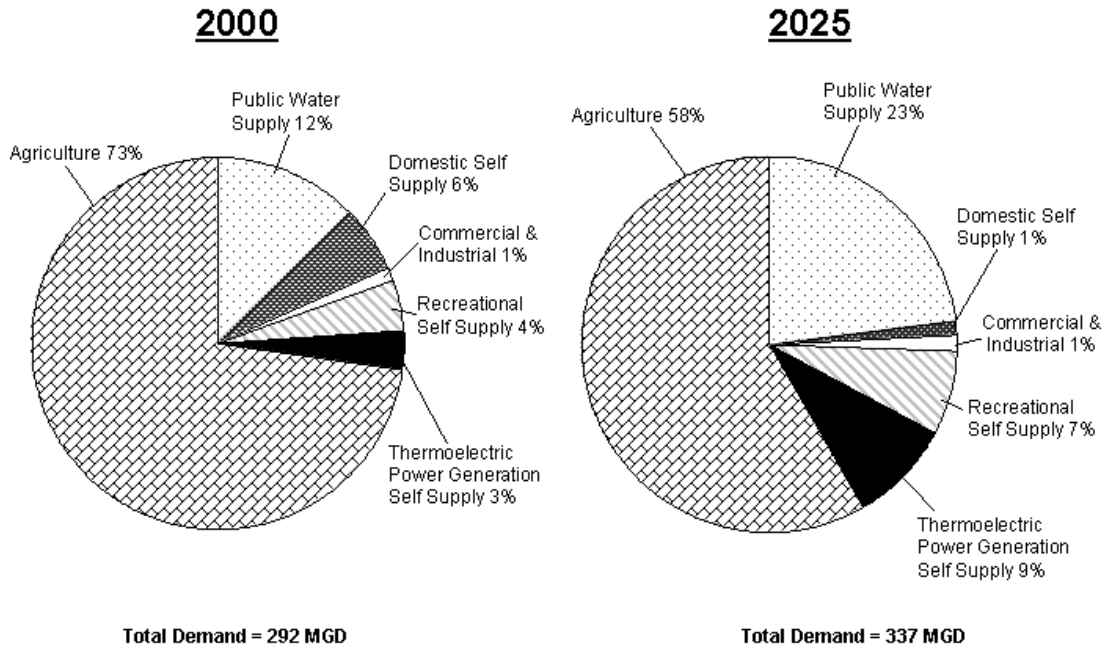

Figure 4. Overall Water Demands for 2000 and 2025 in the UEC Planning Area.

Conservation levels beyond current industry practices were not considered in this phase of the water supply plan, but are dealt with as part of the water source option analysis.

From 2000 to 2025, the total water demand is projected to increase by 15 percent, from 292 to 337 MGD, as shown in **Table 2**. Public water supply has the largest projected increase of 113 percent, while agricultural demand is projected to decline by 7 percent. However, agricultural water demand is projected to remain the single largest category of use. In 2000, agriculture accounted for 73 percent of the total demand, and a slight projected decline in agricultural demands combined with projected increases in urban use results in projected agricultural use declining to 58 percent of the total demand by 2025; this does not include lands coming out of citrus production related to implementation of the Comprehensive Everglades Restoration Plan (CERP). Public water supply demands are projected to increase from 12 percent to 23 percent of the overall water demands.

Table 2. Overall Water Demands for 2000 and 2025 (MGD).

Category	Estimated Demands 2000 (MGD)	Projected Demands 2025 (MGD)	Percent Change 2000–2025
Agriculture[a]	212.8	197.1	-7%
Public Water Supply	36.5	77.8	113%
Domestic Self-Supply	17.0	3.7	-78%
Commercial & Industrial Self-Supply	3.3	4.9	50%
Recreational Self-Supply	12.8	23.8	86%
Thermoelectric Power Generation Self-Supply	9.8	30.0	206%
Total	292.2	337.3	15%

a. Agricultural demand projections do not include approximately 23,000 acres of citrus land coming out of irrigated citrus production with implementation of the CERP.

URBAN WATER DEMAND

Urban water demand includes: 1) public water supply provided by utilities; 2) domestic self-supply; 3) commercial and industrial self-supply; 4) recreational self-supply; and 5) thermoelectric power generation self-supply. Public water supply was the largest component of urban water demand in 2000 (46 percent), followed by domestic self-supply (21 percent), recreational self-supply (16 percent), thermoelectric power generation self-supply (12 percent) and commercial and industrial self-supply (4 percent). Urban water demand in the UEC Planning Area in 2000 was estimated to be approximately 79 MGD and is projected to increase to about 140 MGD in 2025.

The driving force behind urban demand is population. Population numbers for 2000 were taken from the U.S. Bureau of the Census. Population projections for the year 2025 were obtained from the University of Florida Bureau of Economic and Business Research (BEBR, 2002), and are shown in **Table 3**. The total population of the planning area for 2000 was 320,664 and is projected to increase by 52 percent to 486,510 in 2025.

Table 3. Population in the UEC Planning Area, 2000–2025.

County	2000			2025		
	Total	Public Water Supply	Domestic Self-Supply	Total	Public Water Supply	Domestic Self-Supply
St. Lucie County	192,695	129,904	62,791	297,400	290,012	7,388
Martin County	126,731	88,300	38,431	187,500	175,243	12,257
Okeechobee Area	1,238	0	1,238	1,610	0	1,610
Total Planning Area	320,664	218,204	102,460	486,510	465,255	21,255

Source: U.S. Bureau of the Census, 2001 and University of Florida Bureau of Economic and Business Research, 2002.

Public Water Supply and Domestic Self-Supply

The estimated water demand for public water supply (PWS) and domestic self-supply (DSS) users in the UEC Planning Area was 54 MGD in 2000. These water demands are projected to increase by 52 percent from 2000 to 2025 to a total water demand of 82 MGD (**Table 4**). The DSS category includes: residents not living within areas served by utilities; residents living within areas served by utilities, but who are not connected to a utility; and residents served by utilities with historical or projected demands of less than 100,000 GPD (0.1 MGD). About 32 percent of the 2000 population was self-supplied and this is projected to decline to 4 percent by 2025, as self-supplied residents connect to regional utilities, and as future growth is connected to PWS systems. More specific information on utility service area populations and water demands, as well as the methodology used to develop these values is provided in Appendix A.

Table 4. Public Water Supply and Domestic Self-Supplied Demand (MGD).

County	2000		2025	
	Public Water Supply	Domestic Self-Supply	Public Water Supply	Domestic Self-Supply
St. Lucie County	17.7	8.7	42.0	1.0
Martin County	18.8	8.2	35.8	2.5
Okeechobee Area	0.0	0.1	0.0	0.2
Total	36.5	17.0	77.8	3.7

Commercial and Industrial Self-Supply

This category includes self-supplied commercial and industrial demands (**Table 5**). Commercial and industrial demands supplied by public utilities are included with PWS demands. The projection methodology for commercial and industrial self-supply demand is discussed in Appendix A.

Table 5. Commercial and Industrial Self-Supplied Demand (MGD).

County	2000	2025
St. Lucie County	0.1	0.2
Martin County	3.2	4.7
Total	3.3	4.9

Recreational Self-Supply

Recreational demands supplied by PWS utilities are included in the PWS demands. Recreational self-supply demands include demands for landscape and golf course irrigation. Golf course irrigation is the highest recreational water use.

Landscape

Demand projections for this section include irrigated acreage permitted for landscaping and recreation in St. Lucie and Martin counties (**Table 6**), excluding golf courses. In 2000, there were 1,716 acres of irrigated landscape in St. Lucie County, and 1,314 acres in Martin County in the self-supplied, greater than 100,000 GPD category. Projection methodology is discussed in Appendix A.

Table 6. Landscape Self-Supplied Demand (MGD).

County	2000	2025
St. Lucie County	3.2	5.0
Martin County	2.3	3.4
Total	5.5	8.4

Golf Course

Golf Course – St. Lucie County

In 2000, there were 22 golf courses in St. Lucie County (2,497 self-supplied irrigated acres) and 40 golf courses in Martin County (4,104 self-supplied irrigated acres). Golf course demands in the UEC Planning Area are projected to increase from 7.4 MGD in 2000 to 15.6 MGD in 2025 (**Table 7**). Descriptions of the golf courses in St. Lucie and Martin counties, projection methodology, and the self-supplied calculation of irrigation requirements are provided in Appendix A. There are no golf courses in the portion of Okeechobee County within the UEC Planning Area.

Table 7. Golf Course Self-Supplied Demand (MGD).

County	2000	2025
St. Lucie County	3.3	7.0
Martin County	4.1	8.6
Total	7.4	15.6

The sum of the Landscape demands (**Table 6**) and the Golf Course demands (**Table 7**); yield the total recreational self-supplied demands, which are presented in **Table 8**.

Table 8. Recreational Self-Supplied Demand (MGD).

County	2000	2025
St. Lucie County	6.5	12.0
Martin County	6.4	12.0
Total	12.9	24.0

Thermoelectric Power Generation Self-Supply

Thermoelectric power plants may withdraw very large quantities of water for cooling purposes. The vast majority of this water is not consumed, in the sense that the same water may pass through the plant repeatedly, sequentially circulating through a series of ponds. There will, however, be some evaporative losses (mostly related to the heated water being kept in cooling ponds) that must be replaced from an external source beyond rainfall and runoff. This replacement was assessed at 9.8 MGD for 2000 and projected to grow to 30.0 MGD by 2025. This category does not include facilities that use ocean water for cooling.

AGRICULTURAL WATER DEMAND

There are eight categories of agricultural water demand analyzed in this section: 1) citrus; 2) vegetables, melons and berries; 3) field crops (sugarcane); 4) sod; 5) greenhouse/nursery; 6) improved pasture; and 7) miscellaneous (cattle watering). Agricultural water demand was estimated for 2000 to be approximately 213 MGD. Citrus was by far the largest 2000 agricultural water demand (77 percent) and is followed by sugarcane and improved pasture (9 percent each). Vegetables, sod, cut flowers, ornamental nurseries and cattle watering, combined, account for about 5 percent of the total agricultural demand.

Agricultural water demand is forecast to decrease by 7 percent to about 197 MGD in the year 2025. Water demands for citrus irrigation is projected to decrease by 2025, while ornamental nursery demands increase, and other crop demands remain relatively constant. Descriptions of the agricultural acreage in each county, projection methodology and the calculation of irrigation requirements, including data sources, are detailed in Appendix A.

Table 9 shows the historical (2000) and projected (2025) acreages of the different categories of agricultural self-supplied demand in the UEC Planning Area, as well as annual average agricultural irrigation demand by crop. These estimates do not include the irrigated agriculture that may come out of production related to implementation of the CERP (estimated to be approximately 23,000 acres of citrus).

Table 9. Agricultural Water Demand (MGD) and Irrigated Acreage by Crop.

Category	Estimated Demands 2000 (MGD)	Total Irrigated Acreage 2000	Projected Demands 2025 (MGD)	Total Irrigated Acreage 2025	% Change in Demands 2000–2025
Citrus	164.5	149,513	148.1	134,509	-9%
Vegetables	3.6	2,970	3.6	2,970	0%
Sugarcane	19.4	12,478	19.4	12,478	0%
Sod	2.7	960	2.7	960	0%
Greenhouse/Nursery	1.9	942	2.5	1,269	32%
Improved Pasture	18.4	19,000	18.4	19,000	0%
Cattle Watering	2.4	---	2.4	---	0%
Total Planning Area	212.8	185,863	197.1	171,186	-8%

ENVIRONMENTAL WATER SUPPLY

The approach to identifying water supply needs for the environment in this Plan differs from that of urban and agricultural water supply, which are defined based on population and irrigated acreage, respectively. Environmental water supply, primarily wetlands and coastal resources, is provided through resource protection criteria designed to maintain appropriate wetland hydrology and flow regimes, maintaining appropriate water quality in downstream receiving water bodies.

For inland wetland systems, water supply is provided through the use of resource protection criteria designed to prevent harmful drawdowns under wetlands. Maintaining appropriate wetland hydrology (water levels and hydroperiod) is the most critical factor in maintaining a viable wetland ecosystem. Rainfall, along with associated groundwater and surface water inflows, is the primary source of water for the majority of wetlands in the planning area. See Chapter 2 of the *DRAFT Consolidated Water Supply Plan Support Document* and **Chapter 3** of this document for additional information on wetland protection and the water supply needs of inland wetland systems.

For coastal resources, maintenance of appropriate freshwater inflows is essential for a healthy estuarine system. Flow regimes are typically defined in terms of total mean monthly inflows and a suitable range of acceptable minimum and maximum flow rates. Excessive changes in freshwater inflows to the estuary result in imbalances beyond the tolerances of estuarine organisms. The retention of water within upland basins for water supply purposes will provide management of inflows into coastal resources. Flow regimes for coastal resources in the UEC Planning Area will be determined when developing restoration and operation plans associated with construction of proposed storage facilities. See Chapter 2 and Chapter 7 of the *DRAFT Consolidated Water Supply Plan Support Document* and **Chapter 3** of this document for additional information regarding water needs of coastal resources in the planning area.

DEMAND METHODOLOGY

Public Water Supply and Domestic Self-Supply

The urban demand assessment for public water supplied and domestic self-supplied population involved an intensive geographic information system analysis using population data from the U.S. Bureau of the Census and the University of Florida Bureau of Economic and Business Research (BEBR).

For the PWS and DSS assessment, overlaying Census data on utility served area boundaries assessed populations residing within areas served by utilities. The next step involved determining water use rates in the utility served area boundaries using per capita

water use. Per capita water use rates were assessed using the 2000 water withdrawals for each utility reported by the U.S. Geological Survey (USGS) and dividing that number by the 2000 population determined to be in each utility served area. The resulting 2000 per capita water use rates were held constant to project 2025 water demand. Populations in each Census block were projected to grow proportionally with the relevant growth rates specified by the county's Traffic Analysis Zone analysis, up to the county population control total of the BEBR medium population projections (BEBR, 2002). The anticipated 2025 utility served boundaries were then superimposed on the 2025 population data, assigning projected populations to utilities, and then each utility's 2000 per capita rate was applied to yield projected demands for utilities.

The current plan relied on DSS data from the 1998 Plan for overlay with 2000 Census data. The previous plan had access to 1990 Census data that included "source of water" on the Census long-form questionnaire. This item was removed from the 2000 Census long-form questionnaire. The current plan, therefore, used the DSS data from the previous plan, where the same utilities existed. Where new utilities were added to the assessment, the 1990 Census data were overlaid onto the 2000 utility area boundaries for an approximation of self-supplied population. Population in small utilities with pumpages greater than the 100,000 GPD PWS threshold of the 2004 Update and less than the 500,000 GPD threshold of the 1998 Plan shifted from the DSS category in the 1998 Plan to the PWS category in the 2004 Update.

Self-Supplied Categories of Use

The remaining categories of water use are self-supplied and include commercial and industrial, recreational, thermoelectric and agricultural. The methodology for commercial and industrial remains the same as in the 1998 Plan. The 2000 water demands were as reported by the USGS, and projections were made using the population growth rate.

The recreational and agricultural self-supply demand calculations did have a fundamental change in methodology. The 1998 Plan used a modified Blaney-Criddle model to estimate supplemental requirements for irrigation, while the 2004 Update is using the Agricultural Field Scale Irrigation Requirement Simulation (AFSIRS) model to assess irrigation demands. Differences between the models follow.

The agricultural demand assessment involved establishing acreages through collecting data from the Florida Agricultural Statistics Service and the Institute of Food and Agricultural Sciences (IFAS). Following the establishment of acreages by crop types, acreage projections were developed using a mix of statistical and industry feedback information; agricultural water demands were assessed based on those acreage projections. The IFAS extension agents from St. Lucie, Martin and Okeechobee counties reviewed historical (2000) and projected (2025) agricultural acreage information.

CHANGES FROM THE 1998 PLAN

There were several changes made in the demand assessment and projection methodology used in the 1998 Plan for the 2004 Update. These are summarized as follows:

Census blocks used instead of Census block groups. The population analysis conducted in this 2004 Update used census blocks; whereas block groups were used for the 1998 Plan. A Census block is the smallest Census geographic area, normally bounded by streets and other prominent physical features. A Census block has a higher resolution than a group of blocks (Census block group), therefore, use of blocks rather than block groups provide a higher level of precision.

BEBR medium population projections used instead of county comprehensive plan projections. In the development of the 1998 Plan, the original projection horizon was 2010, and county population projection control totals were taken from the county comprehensive plans. In 1997, as plan development progressed, Chapter 373, F.S. was amended to require that water supply plans include (among other things) a 20-year planning horizon. Based on this, the planning horizon of the 1998 Plan was changed to 2020. The population projection sources (comprehensive plans) did not go beyond 2010; however, it was observed, that the county comprehensive plan population projections for 2010 approximated the BEBR 2020 medium population projections—so the analysis stood. For this 2004 Update, the BEBR medium projections for 2025 (BEBR, 2002) were used as population control totals for each county.

A decreased water use threshold for PWS utilities from 500,000 to 100,000 gallons per day. This had the effect of increasing the number of PWS utilities analyzed, from 15 in the 1998 Plan to 19 in the 2004 Update.

Supplemental irrigation needs determined using the AFSIRS model versus a modified Blaney-Criddle model. Both of these models estimate evapotranspiration (ET) in order to derive supplemental irrigation requirements for agricultural crops and outdoor irrigation. However, in south Florida, the Blaney-Criddle model tends to overestimate ET, which is the driving component of supplemental irrigation. As a result, the Blaney-Criddle model has the potential to overestimate supplemental irrigation requirements. To address this, District staff began utilizing the Agricultural Field Scale Irrigation Requirement Simulation (AFSIRS) model as the regional water supply plans were updated. The AFSIRS model yields supplemental irrigation requirements that better reflect historic use patterns, and are generally lower than the modified Blaney-Criddle model on an annual basis.

COMPARISON WITH 1998 PLAN PROJECTIONS

This section includes a comparison of the population and water demands between the 1998 Plan and the 2004 Update. Overall water use demand projections decreased from the 1998 Plan projections by 40 percent (**Table 10**). The 2004 Update included higher projections for 2025 for public water supply, commercial and industrial self-supply and thermoelectric power generation self-supply (which was not addressed in the 1998 Plan).

Table 10. Comparison of Population and Water Demands Projections in 1998 Plan versus 2004 Update.

	1998 UECWSP for 2020	2004 UECWSP Update for 2025	% Change 1998 Plan (2020) vs. 2004 Update (2025)
Population	445,925	486,510	9%
Total Water Use (MGD)	565.4	337.3	- 40%
Public Water Supply (MGD)	64.4	77.8	21%
Domestic Self-Supply (MGD)	18.8	3.7	- 80%
Commercial & Industrial Self-Supply (MGD)	4.3	4.9	14%
Recreational Self-Supply (MGD)	38.1	23.8	- 38%
Thermoelectric Power Generation Self-Supply (MGD)	Not Addressed	30.0	
Agriculture Self-Supply (MGD)	439.8	197.1	- 55%

Table 10 shows a comparison of the level of demands that were analyzed in the 1998 Plan for a 2020 projection horizon, versus the demands projected in the 2004 Update for a 2025 projection horizon. The demand numbers differ for the following reasons:

- The irrigation model used in the 1998 Plan was a modified Blaney-Criddle model, whereas the AFSIRS model is used for the 2004 Update. Use of that version of the Blaney-Criddle model generally results in a higher per acre irrigation than AFSIRS. For example, the Blaney-Criddle model gives average annual irrigation demands for citrus in the UEC (on typical soil types) ranging from 18 to 25 inches, whereas the comparable AFSIRS range is 13 to 16 inches.
- The projection for irrigated agricultural acreage in the 1998 Plan anticipated a significant increase in citrus acreage (the dominant crop in the region), whereas the 2004 Update anticipates a modest decline (not including current citrus lands that may be used for the CERP).

- The decrease in domestic self-supplied demands is due to the lowering of the threshold dividing the PWS and DSS categories (meaning that four smaller utilities are included in the PWS category) in the 2004 Update, that were previously in the DSS category of the 1998 Plan. Additionally, it is anticipated that self-supplied users within utility served areas will connect to regional utilities by 2025.

Uncertainties Associated with Demand Projections

Demand projections are based on the extrapolation of trends and circumstances that change over time. For example, observed and projected growth in citrus acreage during the preparation of the 1998 Plan has since reversed into a decline. There have been some acreage increases in ornamental nursery, but not of the same magnitude as the reduction in citrus acreage. Trend changes, such as this are incorporated in the five-year updates to the Plan.